Minnegram

The Water Resources Center's quarterly newsletter focuses on water-related issues.
Sign-up to receive Minnegram.

For past issues of Minnegram, visit the University of Minnesota Libraries' Digital Conservancy.

Summer 2017 Minnegram

Features

Retirement just a change of course on Faye Sleeper's road map

Faye Sleeper decided early on that being a woman was not going to limit her life choices. Her father taught her to change tires and motor oil and she was her own bike mechanic. Her parents' life and work ethic of fairness and kindness to all, cautious optimism and unwavering stewardship for the earth, had a profound effect on their daughter who carried those lessons into her life and work.

Meeting Minnesota's Needs for Stormwater Research
Reducing and preventing impact from urban stormwater runoff

By John Bilotta bilot002@umn.edu Extension Water Team

University of Minnesota researchers are working to meet the immediate and ongoing need for additional research in stormwater management, practices, and policies for Minnesota.
One project is the Stormwater Research Roadmap to articulate and prioritize research needs that can propel stormwater management and practice implementation forward to reduce and prevent pollution from urban stormwater runoff.

HABs explained: what, how and what now?

By Shahram Missaghi miss0035@umn.edu *Extension Water Team and Marte Kitson* mkitson@d.umn.edu

Algae blooms can turn the water green and smelly, and contribute to fish kills by creating dead zones in the water. At times, algae bloom also produce toxins that pose serious health risks to people and animals, and these algae are referred to as Harmful Algal Blooms or HABs. Blue-green algae or Cyanobacteria are one of the major types of HABs that are also found in Minnesota.

Universities Council on Water Resources awards Deborah Swackhamer the Warren A. Hall Medal

The Universities Council on Water Resources (UCOWR) has awarded Deborah Swackhamer (former WRC co-director) the Warren A. Hall Medal in honor of her lifetime achievements in water resources research and education. Dr. Warren A. Hall, known worldwide for his active involvement in water resources research and education, was one of the founders of UCOWR. The Warren A. Hall Medal is a memorial established by friends and family to recognize exceptional accomplishments and distinction of an individual in the water resources field.

Water science and policy salon present priorities to Governor Dayton

During Governor Mark Dayton's Year of Water Action, the Water Resources Center convened a series of Water Science and Policy Salons to identify policy strategies that will provide significant movement towards meeting the goals put forth in the Minnesota Nutrient Reduction Strategy.

Sleeper honored amid climate awards at National Adaptation Forum

Mark Seeley, climatologist with the UMN Department of Soil Water and Climate, handed out Climate Adaption awards at the

May 2017 National Adaptation Forum in St. Paul. Seeley began the award portion of the program by presenting an award to recently retired WRC Associate Director Faye Sleeper

News

The Water Resources Center is a unit of the College of Food, Agricultural and Natural Resource Sciences and University of Minnesota Extension.

Water Resources Center | 173 McNeal Hall | 1985 Buford Avenue | St. Paul, MN 55108
612-624-9282 | umwrc@umn.edu

l 2017 Director's Corner

Unbelievably to me anyway, October is already here and that means that the Minnesota Water Resources Conference is just around the corner. I am really excited about this year's program. Featured speakers will include Amy Skoczlas Cole, Director of American Public Media's Water Initiative; Greg Page, retired Cargill Chairman and CEO; Michael Sadowsky, Professor of Soil, Water, and Climate at the University of Minnesota; and Nancy Schuldt, Water Projects Coordinator for the Fond du Lac Band of Lake Superior Chippewa. A special session will explore the promise of new continuous living cover cropping systems to provide water quality and other ecological benefits. And, backed by popular demand, Water Bar returns to the conference this year, this time in an expanded format that captures themes from the conference and aims to connect attendees to the water stewardship traditions of the Dakota people. You can learn much more about the conference in a feature article in this issue, and you can register to attend on the conference website.

Autumn also means that the University campus is again bustling with students. As many Minnegram readers know, the WRC is the administrative home of the Water Resources Science (WRS) graduate program, which welcomed a select cohort of new students this fall. Recently the WRC has expanded its support for the WRS program, using our unique set of connections to aid in students in their professional development. We're hosting a series of professional development workshops and helping students develop professional networks at gatherings events like the Water Resources Conference. I hope you will see some of them there and get a chance to talk with them. Another way we are supporting the program is by sponsoring fellowship to an outstanding incoming WRS student. At the recommendation of the WRS Directors of Graduate Studies, we were pleased to award the inaugural WRC Graduate Student Fellowship to Kirsten Rhude. You can read more

about the fellowship and Kirsten in our Community News section.

Recent months also brought changes and additions to the WRC staff. We are excited to welcome Lucy Levers as a new research associate. Lucy has an interdisciplinary background in environmental science and economics and specializes in integrated modeling. She earned her PhD from the University of California - Riverside and worked at the USDA-ARS Salinity Lab in Riverside before joining the WRC. We also are excited to welcome Douglas Johnson as our new finance professional, a pivotal staff position to keep all our programs running smoothly. Doug has a wealth of experience in finance roles at various units in the University of Minnesota. Lucy and Doug are also featured in Community News.

Our staff has been growing, but we are not done growing yet. We're developing staffing plans to take on new projects, like a recent grant award from the Innovations at the Nexus of Food, Energy, and Water Systems (INFEWS) program at the National Science Foundation. We'll be looking forward to filling you in on these projects as they unfold in future issues.

In this issue, you'll find lots to read about recent activities and timely topics. A pair of feature articles by University of Minnesota Extension experts focus on the pressing issue of aquatic invasive species (AIS). Dan Larkin discusses one of the most recently detected aquatic invasives, the algal species starry stonewort. Megan Weber describes the growing AIS Trackers Program in Minnesota, which contributes to a larger citizen science movement across the nation.

I hope to see you at the conference,

The Water Resources Center is a unit of the College of Food, Agricultural and Natural Resource Sciences and University of Minnesota Extension.

Water Resources Center | 173 McNeal Hall | 1985 Buford Avenue | St. Paul, MN 55108
612-624-9282 | umwrc@umn.edu

CFANS
COLLEGE OF FOOD, AGRICULTURAL AND NATURAL RESOURCE SCIENCES

UNIVERSITY OF MINNESOTA
EXTENSION

tirement just a change of course on Faye Sleeper's road map

Faye Sleeper decided early on that being a woman was not going to limit her life choices. Her father taught her to change tires and motor oil and she was her own bike mechanic. Her parents' life and work ethic of fairness and kindness to all, cautious optimism and unwavering stewardship for the earth, had a profound effect on their daughter who carried those lessons into her life and work. "My parents modeled a conservation ethic long before it was trendy," she says. Both Faye's parents had advanced education and valued a college education for their daughter.

Faye carried this framework into her college studies, majoring in social work. Upon graduation she worked for a few years in corrections, then transitioned into working with troubled young people in residential centers. That work cemented her work management style; learning to stand firm, while seeking out the best that each person has to offer, and helping foster those qualities.

Needing a work life change, Faye did a career assessment at the University of Minnesota, which landed her in cartography, though the world was moving away from paper maps, so she made the switch to environmental policy, a period of time during which she jokingly says "My dream was to sit in a canoe and draw up maps of the Boundary Waters, like they don't already exist!"

An internship at the DNR land section division led in turn to a position at the Minnesota Pollution Control Agency (MPCA), in the Construction Grants Program, which provided funding and enforcement of wastewater management rules. At one time, Faye oversaw 150 municipal wastewater facilities in the Brainerd/Detroit Lakes area.

As Faye moved into management and non-source point pollution at the MPCA, she oversaw the development of the Impaired Waters Stakeholder process, a series of meetings with environmental groups, business concerns, agriculture groups, Soil Water Conservation Districts, and cities, with a goal of making changes that would matter to water quality. It was

this work that created the foundation for what became the Clean Land and Water Legacy Act. In reflecting on this outcome, Faye says "Program development is like being in whitewater constantly until the end; satisfying work, but not always comfortable."

Faye was aware of the Water Resources Center through interaction with Deb Swackhamer and Jim Anderson in her work at the MPCA and she was impressed with the work of the center. When the position of co-director was offered to her, she jumped at the chance to move from a regulatory focus to promoting research-based solutions to water problems. Avenues not open to her at the agency blossomed before her. One of many firsts: an invitation to be a co-author of a book chapter about the beginnings of the Clean Land and Water Legacy Act, a process that she really enjoyed. Other opportunities included sitting on the Board of Water and Soil Resources, planning the first and successive Climate Adaptation conferences in Minnesota, developing the Watershed Specialist Training program with Ann Lewandowski, and most recently, aligning the UMN Extension Water Team more closely with the WRC.

"So much variety. Even in the tough times, working with people who have so much knowledge and passion for water . . .so worthwhile. I'm fortunate to have had this opportunity with the WRC to do so many things."

There will be plenty of variety in retirement for Faye. Her immediate future includes European travels and exploring neglected treasures closer to home.

Look for Faye on the water in a kayak, or on her bike, possibly fixing her own broken bicycle chain on the side of the road.

Faye Sleeper kayaking on Mirror Lake in Wisconsin in 2016.

Photo credit: Jane Stone Tonn-Kreski

and Natural Resource Sciences and University of Minnesota Extension.

612-624-9282 | umwrc@umn.edu

CFANS
COLLEGE OF FOOD, AGRICULTURAL AND NATURAL RESOURCE SCIENCES

UNIVERSITY OF MINNESOTA
EXTENSION

eeting Minnesota's Needs for Stormwater Research

Reducing and preventing impact from urban stormwater runoff

By John Bilotta, Extension Water Team

University of Minnesota researchers are working to meet the immediate and ongoing need for additional research in stormwater management, practices, and policies for Minnesota.

One project is the Stormwater Research Roadmap to articulate and prioritize research needs that can propel stormwater management and practice implementation forward to reduce and prevent pollution from urban stormwater runoff. It involves a two part process. First, researchers collected research needs from multiple discussions with stakeholders and assessments in published reports. The interim results, available summer of 2017, highlight seven core areas of research needed:

1. Source Reduction and Pollution Prevention
2. Characterization of Stormwater Runoff
3. Impacts of Surface and Groundwater
4. Treatment Practice Effectiveness
5. Maintenance, Longevity, and Cost/Benefit
6. Public Policy and Education
7. Emerging Concerns

Part two involves understanding more specifically what are the research needs and their priorities within those seven areas. Researchers will conduct a comprehensive survey of stakeholders across the state including MS4 communities, watershed districts and organizations, and water planners. Workshops, listening sessions, professional interviews, and a literature

review will round out the sources of input that will all eventually lead into a ten year framework or roadmap of priority research needs across the state. Announcements regarding the survey, workshops, and interviews will be posted on the project website. For more information, visit https://www.wrc.umn.edu/stormwatermpca

At the same time as the Roadmap project, the independent Minnesota Stormwater Research Council was established in 2016., has created its first pooled-funds approach for applied stormwater research. The Council was established to

- Facilitate the completion of needed applied research that enables more informed decisions about the use, management and protection of our water resources in urbanized areas.
- Periodically assess the status of research, identify consensus research priorities, and communicate these to Minnesota's public and private research agencies and organizations.
- Promote coordination of research goals, objectives and funding among the research agencies and organizations.

The Council is an independent organization of stormwater professionals, practitioners, managers, engineers, researchers and others facilitated by the UMN Water Resources Center. The Council is accepting research proposals through June 15th for applied research projects in three priority areas:

- Pre-treatment for stormwater practices.
- Effectiveness of current stormwater practices.
- Chloride/road salt use, management, pollution, and best practices.

The Council has approximately $80K in pooled funds available for this competition. The request for proposals and more information about the Council can be found at https://www.wrc.umn.edu/msrc

The Water Resources Center is a unit of the College of Food, Agricultural and Natural Resource Sciences and University of Minnesota Extension.

Water Resources Center | 173 McNeal Hall | 1985 Buford Avenue | St. Paul, MN 55108
612-624-9282 | umwrc@umn.edu

CFANS
COLLEGE OF FOOD, AGRICULTURAL AND NATURAL RESOURCE SCIENCES
UNIVERSITY OF MINNESOTA
EXTENSION

ABs explained: what, how and what now?

***By Shahram Missaghi** miss0035@umn.edu **and Marte Kitson** mkitson@d.umn.edu*

Algae Terminology 101

Algae are water-based photosynthesizing organisms that make their own food by using solar energy. Algae is not a type, group, domain, or kingdom of living things, but rather a collection of various organisms represented from different aquatic groups that can make their own food and are autotrophs. And so, algae come in many forms and shapes and are presented globally everywhere. They are one of the oldest known organisms. Algae are the primary producer (food) in aquatic systems and people have long been using them for food, medicine, and fuel as well.

Algae blooms can turn the water green and smelly, and contribute to fish kills by creating dead zones in the water. Photo credit: Alaina Fedie, Science Museum of Minnesota

Some algae begin their growth from the bottom sediments and spend their whole life cycle attached to sediment, others may become detached from the sediment and spend part of their life cycle floating in the water, while some only grow attached to

other things, and yet many algae spend all or most of their life cycles suspended in the water as part of the plankton community, and are known as phytoplankton.
Under the right temperature and water conditions, some planktonic algae can grow very rapidly and form extremely high-density populations, or "blooms."

Algae blooms can turn the water green and smelly, and contribute to fish kills by creating dead zones in the water. At times, algae bloom also produce toxins that pose serious health risks to people and animals, and these algae are referred to as Harmful Algal Blooms or HABs. Blue-green algae or Cyanobacteria are one of the major types of HABs that are also found in Minnesota. With over 1500 freshwater species, cyanobacteria are well suited to live and grow in many aquatic systems. They generally tend to respond well to increased levels of a nutrient in the water and show a strong correlation between increased nutrient (total phosphorus) and their increased biomass. They also thrive in increased water temperature. Cynaobacteria can form HABs, become invasive, and produce toxins. More frequent HABs may be triggered by a number of factors including urban and agricultural runoff, as well as climate change.

What can you do to reduce HABs?

Fending off HABs starts upstream on the landscape with stormwater management as a critical part of HABs prevention to minimize excessive nutrients reaching our water bodies as well as understanding our aquatic systems to implement proper in-lake managements. University of Minnesota researchers have long been interested in HABs and minimizing their negative effects. Recently, using new lake-monitoring technology, Minnesota state agencies and scientists created a more complete picture of potential HABs in Minnesota. They also have come together to form a collaborative group to learn from each other, exchange ideas, provide training for water resources professionals, and provide public education.

The MN HAB group held a workshop (03/2016), funded by Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources (LCCMR), that was attended by more than 30 researchers and scientists from the University and state agencies. The group has also developed a web page (z.umn.edu/algae) to promote communication among all interested parties where you can also sign up to get e-news about blue-green algae in Minnesota lakes. So, get involved and sign up to join the group to understand HABs better and to protect and manage our state water resources.

The Water Resources Center is a unit of the College of Food, Agricultural and Natural Resource Sciences and University of Minnesota Extension.

CFANS
COLLEGE OF FOOD, AGRICULTURAL AND NATURAL RESOURCE SCIENCES

Water Resources Center | 173 McNeal Hall | 1985 Buford Avenue | St. Paul, MN 55108
612-624-9282 | umwrc@umn.edu

UNIVERSITY OF MINNESOTA
EXTENSION

iversities Council on Water Resources awards Deborah Swackhamer the Warren A. Hall Medal

The Universities Council on Water Resources (UCOWR) has awarded Deborah Swackhamer (former WRC co-director) the Warren A. Hall Medal in honor of her lifetime achievements in water resources research and education. Dr. Warren A. Hall, known worldwide for his active involvement in water resources research and education, was one of the founders of UCOWR. The Warren A. Hall Medal is a memorial established by friends and family to recognize exceptional accomplishments and distinction of an individual in the water resources field. Swackhamer will receive the award during the UCOWR Awards Banquet on Wednesday, June 14, 2017, at the Lory Student Center on the campus of Colorado State University in Fort Collins, Colorado.

Swackhamer served on the Minnesota Clean Water Council from 2007-2016 and was a member of the US EPA Science Advisory Board from 2003-2012, serving as Chair from 2008-2012. From 2006-2012 she was a member of the Board of Directors, National Institutes of Water Resources (NIWR), and served as President of NIWR 2010-2011. Swackhamer was named University's Charles M. Denny Jr. Chair in Science, Technology and Public Policy in 2009 and had a joint appointment between Hubert H. Humphrey School of Public Affairs and the School of Public Health, Environmental Health Sciences. Swackhamer received the Ada Comstock Scholar Award, University of Minnesota in 2010. A Fellow of the Royal Society of Chemistry, Swackhamer received the Society of Environmental Toxicology and Chemistry (SETAC) Founders Award for lifetime achievement in the environmental sciences in 2009 and was named an Inaugural SETAC Fellow in 2014.

Currently, Swackhamer serves on National Academy of Science standing Board of Environmental Science and Toxicology.

“Dr. Swackhamer’s impact on water science is remarkable. Most impressively, she was unrivaled at bringing diverse and often conflicting interests to address policy issues based on science. This resulted in applied policies and technical solutions that led to real and substantive changes in water quality for all Minnesotan’s.” said CFANS Dean Brian Buhr.

The Water Resources Center is a unit of the College of Food, Agricultural and Natural Resource Sciences and University of Minnesota Extension.

Water Resources Center | 173 McNeal Hall | 1985 Buford Avenue | St. Paul, MN 55108
612-624-9282 | umwrc@umn.edu

CFANS
COLLEGE OF FOOD, AGRICULTURAL AND NATURAL RESOURCE SCIENCES
UNIVERSITY OF MINNESOTA
EXTENSION

ter science and policy salon presents priorities to Governor Dayton

During Governor Mark Dayton's Year of Water Action , the Water Resources Center convened a series of Water Science and Policy Salons to identify policy strategies that will provide significant movement towards meeting the goals put forth in the Minnesota Nutrient Reduction Strategy. Participants in the Salons were some of the best minds in agriculture research, economics, policy, and agribusiness. Their objective was to develop scientifically-based strategies that would have measurable and meaningful impact on water for the long term, while protecting and strengthening the agricultural economy by leveraging existing agricultural markets and institutions and developing new markets that support clean water. The priorities identified were presented to Governor Dayton to consider to meet his announced goal of a 25% improvement in water quality by 2025.

The Water Resources Center is a unit of the College of Food, Agricultural and Natural Resource Sciences and University of Minnesota Extension.

Water Resources Center | 173 McNeal Hall | 1985 Buford Avenue | St. Paul, MN 55108
612-624-9282 | umwrc@umn.edu

CFANS
COLLEGE OF FOOD, AGRICULTURAL AND NATURAL RESOURCE SCIENCES
UNIVERSITY OF MINNESOTA
EXTENSION

eeper honored amid climate awards at National Adaptation Forum

Mark Seeley, climatologist with the UMN Department of Soil, Water, and Climate, handed out Climate Adaption awards at the May 2017 National Adaptation Forum in St. Paul. Seeley began the award portion of the program by presenting an award to recently retired WRC Associate Director Faye Sleeper:

“The Minnesota Climate Adaptation Partnership is most happy to salute Faye Sleeper upon the occasion of her retirement from the University of Minnesota Water Resources Center in April of 2017. But most importantly we we want to acknowledge her years of contribution to spearheading the formation, composition, and direction of the MCAP group. She has provided outstanding leadership in this regard and we will all greatly miss her,” said Seeley.

After the presentation to Sleeper, Seeley made the following remarks regarding awardees in these categories:

Health Professionals for a Healthy Climate (HPHC)

HPHC is to be commended as a unified voice for the health care professionals concerned about the severe risks associated with climate change, and the impacts to human health that are already occurring. As a grassroots organization HPHC is engaging state and federal agencies as well as policy makers to help them become more climate-literate and to enact policies and regulations that will promote more effective and timely

UMN Climatologist Mark Seeley presents former Water Resources Center Associate Director Faye Sleeper an award acknowledging her contributions to the Minnesota Climate Adaptation Partnership

climate adaptation practices. They serve as a terrific role model for other organizations to assemble coalitions of professionals concerned for the negative consequences of climate change.

Climate Minnesota: Local Stories, Community Solutions

Climate Generation is to be commended for their outstanding efforts in education and community engagement related to climate adaptation over many years work in metropolitan and greater Minnesota. They serve as an example for many other organizations in terms of promoting sustainable practices, uses of alternative energy, and climate literacy. They have successfully engaged citizens from a broad range of communities, infrastructure, and economic sectors.

Institution Category:

UMM is to be commended in successfully promoting the “Morris Model” for public engagement and leading widespread planning for climate adaptation throughout the infrastructure of the greater community that surrounds the campus. In promoting climate resilience UMM has successfully partnered with many different units of government and non-profit organizations to address areas of concern where climate change is already having impacts. They serve as a terrific role model for other institutions to engage their surrounding community in meeting the challenges of climate change.

Business Category:

Murphy Warehouse is to be commended for their outstanding efforts in climate adaptation over many years. They have worked diligently to reduce fuel consumption, adopt environmentally responsible procurement and waste management policies, and cultivate sustainable behaviors on the part of their employees and customers. Murphy serves as an example

for many in the business sector in terms of operational efficiency, sustainable practices, uses of alternative energy, and reduction in water use.

Individual Category:

Through her work at the Minnesota Department of Natural Resources Olivia LeDee is to be commended for helping to develop one of the most progressive fish and wildlife climate adaptation programs in the country and for helping to foster adaptation policy considerations among the other state and federal agencies you work with. She serves as a terrific role model for many others who work in state and federal agencies to protect, preserve and sustain our natural resources in the context of a changing climate.

The National Climate Adaptation Forum was formed by adaptation professionals from the private and public sectors interested in creating strategies for the potential impacts of climate change. This was their third Forum and their first event in Minnesota.

The Water Resources Center is a unit of the College of Food, Agricultural and Natural Resource Sciences and University of Minnesota Extension.

Water Resources Center | 173 McNeal Hall | 1985 Buford Avenue | St. Paul, MN 55108
612-624-9282 | umwrc@umn.edu

mmer 2017 Community News

Jay Austin (WRS faculty) Professor in Physics and Large Lakes Observatory, SCSE is the recipient of the 2016-17 Chancellor's Award for Distinguished Research/Creative Activity.

John Gulliver (WRS faculty, CE) will be starting the project: “Characterization of Runoff Quality from Paved Low Volume Roads and Optimization of Treatment Methods,” with funding from the Minnesota Local Road Research Board, in July 2017.

Lucinda Johnson, (WRS faculty, Associate Director and Initiative Director at UMD's Natural Resources Research Institute) was recently reappointed to a second three year term to the International Joint Commission's (IJC) Science Advisory Board. The board provides advice on research to the IJC and Great Lakes Water Quality Board. It also provides advice on referred scientific matters. Dr. Johnson serves on the IJC's Science Priority Committee.

Sergei Katsev and Cody Sheik (WRS faculty, UMD Large Lakes Observatory) participated in the African Great Lakes conference in Entebbe, Uganda, on the shore of Lake Victoria, where they, in collaboration with colleagues at the University of Iowa and Minnesota State University Mankato, were awarded a NSF grant for a project that focuses on a meromictic Brownie Lake in downtown Minneapolis. The study investigates geochemical and microbial processes that may help understand the operation of analogous processes in the Earth oceans 2.5 billion years ago.

WRC Director and Applied Economic Professor **Jeff Peterson** is featured in Minnesota Alumni Magazine's summer 2017 issue on agriculture and the future of farming. Water as Common Ground (.pdf)

Andy Wickert (WRS faculty, Earth Sciences), **Diana Karwan** (WRS faculty, FR), and Chad Sandell, were awarded a USGS Innovation Center grant for a geopone-based seismometer

The Water Resources Center is a unit of the College of Food, Agricultural and Natural Resource Sciences and University of Minnesota Extension.

Water Resources Center | 173 McNeal Hall | 1985 Buford Avenue | St. Paul, MN 55108
612-624-9282 | umwrc@umn.edu

CFANS
COLLEGE OF FOOD, AGRICULTURAL AND NATURAL RESOURCE SCIENCES
UNIVERSITY OF MINNESOTA
EXTENSION

mmer 2017 Student News

Anna Baker received a WRS Travel Grant for $567 to present a poster entitled "Sediment as Modulator of Phosphorus Dynamics in Post-Glacial Channels" at the Geological Society of the Americas North East/North Central meeting in Pittsburgh, PA on March 19-21, 2017. Baker is advised by **Jacques Finlay** and **Karen Gran**.

Brian Bohman was awarded a fellowship with the MnDrive Global Food Ventures program for 2017-18. The Fellows participate in activities designed to help build their skills in communications and problem solving along with pursuing individual research projects. Bohman is advised by **David Mulla** and **Carl Rosen**.

Ann Marie Halbach received her MS degree in January 2017. Her thesis was entitled: *Trends in Total Phosphorus Concentrations in Urban and Non-Urban Environments*. She was advised by **Robert Sterner**

Sophie LaFond-Hudson received a WRS Travel Grant for $157 to give a presentation entitled *Iron Sulfide Precipitates on the Roots of Wild Rice* at the annual meeting of the Midwest Chapter of the Society of Environmental Toxicology and Chemistry in Minneapolis on March 20-22, 2017. LaFond-Hudson is advised by **Nathan Johnson**.

Elizabeth Taylor Nelson received her MS degree in December 2016. Her thesis was entitled: *Water use at Minnesota rest areas*. Nelson was advised by **Sara Heger**.

Seth Thompson received a WRS Travel Grant for $588 to present a poster entitled *Stoichiometry of Water-Extractable Organic Matter in North American Grasslands* at the annual meeting of the Association of the Sciences of Limnology and Oceanography in Hawaii on February 26-March 3, 2017. Thompson is advised by **Jim Cotner**.

Dylan Timm received his MS degree in December 2016. His thesis was entitled: Identifying critical source areas for best management practice targeting in impaired Zumbro River watersheds using digital terrain analysis. Timm was advised by **David Mulla**.

Daniel Titze, University of Minnesota-Duluth, received the JGLR/Elsevier Student Author Award for his article *Novel*, direct observations of ice on Lake Superior during the high ice coverage of winter 2013–2014, Journal of Great Lakes Research 42: 492-501. This award, valued at $750, recognizes a student scientist who is first author on a top-ranked article in the Journal of Great Lakes Research. The article was coauthored with his advisor **Jay Austin**. Titze also received his PhD in November 2016. His dissertation was entitled: *Characteristics, Influence, and Sensitivity of Ice Cover on the Great Lakes*.

Xiaowei Zhao received her PhD in November 2016. Her dissertation was entitled: Bacterial Community Dynamics on Suspended Particle Microscopic Islands and Implications for the Theory of Island Biogeography. Zhao was advised by **Randall Hicks**.

The Water Resources Center is a unit of the College of Food, Agricultural and Natural Resource Sciences and University of Minnesota Extension.

Water Resources Center | 173 McNeal Hall | 1985 Buford Avenue | St. Paul, MN 55108
612-624-9282 | umwrc@umn.edu

mmer 2017 Resources and Publications

Nitrification gene ratio and free ammonia explain nitrite and nitrous oxide production in urea-amended soils

Breuillin-Sessoms, F., R.T. Venterea, M.J. Sadowsky, J.A. Coulterd, T. J. Cloughe and P. Wanga

Soil Biology and Biochemistry, Volume 111, August 2017. Pages 143–153

The atmospheric concentration of nitrous oxide (N 2 O), a potent greenhouse gas and ozone-depleting chemical, continues to increase, due largely to the application of nitrogen (N) fertilizers.

Next-generation sequencing and culture-based techniques offer complementary insights into fungi and prokaryotes in beach sands

Romão, D., C. Staley, F. Ferreira, R. Rodrigues, R. Sabino, C. Verissimo, P. Wang, J. Sadowsky and J. Brandao

Marine Pollution Bulletin, 2017

A next-generation sequencing (NGS) approach, in conjunction with culture-based methods, was used to examine fungal and prokaryotic communities for the presence of potential pathogens in beach sands throughout Portugal.

Solid-phase arsenic speciation in aquifer sediments: a micro-X-ray absorption spectroscopy approach for quantifying trace-level speciation

Nicholas, S.L., M.L. Erickson, L.G. Woodruff, A.R. Knaeble, M.A. Marcus, J.K. Lynch and B.M. Toner

Geochimica et Cosmochimica Acta, 2017

Arsenic (As) is a geogenic contaminant affecting groundwater in geologically diverse systems globally. Arsenic release from aquifer sediments to groundwater is favored when biogeochemical conditions, especially oxidation-reduction (redox)

potential, in aquifers fluctuate. The specific objective of this research is to identify the solid-phase sources and geochemical mechanisms of release of As in aquifers of the Des Moines Lobe glacial advance.

Ecological Stoichiometry beyond Redfield: An Ionomic Perspective on Elemental Homeostasis
Jeyasingh, P.D., J.M. Goos, S.K. Thompson, C.M. Godwin and J. Cotner
Frontiers in Microbiology, 2017.

Elemental homeostasis has been largely characterized using three important elements that were part of the Redfield ratio (i.e., carbon: nitrogen: phosphorus). These efforts have revealed substantial diversity in homeostasis among taxonomic groups and even within populations. Understanding the evolutionary basis, and ecological consequences of such diversity is a central challenge. Here, we propose that a more complete understanding of homeostasis necessitates the consideration of other elements beyond C, N, and P.

Cost-effective Land Use Planning: Optimizing Land Use and Land Management Patterns to Maximize Social Benefits
Pennington, D.N., B. Dalzell, E. Nelson, D. Mulla and S. Taff
Ecological Economics, 2017

Improving water quality and other ecosystem services in agriculturally dominated watersheds is an important policy objective in many regions of the world. A major challenge is overcoming the associated costs to agricultural producers. We integrate spatially-explicit

Quantifying the electron donating capacities of sulfide and dissolved organic matter in sediment pore waters of wetlands
Wallace, G., M. Sander, Y.P. Chin and W. Arnold
Environmental Science: Processes & Impacts. 2017

Electron donating capacity (EDC) values were determined for a set of pore water samples collected from the sediments of four separate wetlands in the Cottonwood Lakes Study Area in Jamestown, ND by mediated electrochemical analysis, reaction with substituted nitro(so)benzenes, and calculation based on measured organic carbon and sulfide concentrations. The samples were taken from four hydrologically connected and increasingly sulfidic wetlands within the study site.j

The Water Resources Center is a unit of the College of Food, Agricultural and Natural Resource Sciences and University of Minnesota Extension.

CFANS
COLLEGE OF FOOD, AGRICULTURAL AND NATURAL RESOURCE SCIENCES

Water Resources Center | 173 McNeal Hall | 1985 Buford Avenue | St. Paul, MN 55108
612-624-9282 | umwrc@umn.edu

UNIVERSITY OF MINNESOTA
EXTENSION

mmer 2017 Upcoming Events

Aqua Chautauqua

August 12, 2017

Otter Tail River Watershed, Fergus Falls

Part of the Watershed Education Program, in line with WEP's intent of providing "community leaders, citizens, and natural resources professionals with knowledge and tools to make informed water and land use decisions to protect and restore the integrity of Minnesota's lakes, rivers, and wetlands." The event will consist of multiple learning stations situated along the banks of the river.

Minnesota Water Resources Conference

October 17–18, 2017

Saint Paul RiverCentre

The Minnesota Water Resources Conference presents innovative, practical, and applied water resource engineering solutions, management techniques, and current research about Minnesota's water resources. The conference provides an opportunity to address: 1) lessons learned from the implementation of engineering projects, 2) best practices discovered in the design and application of water resource management techniques, 3) implications of water policy decisions, and 4) research into current and emerging issues. The conference facilitates interaction among engineers, water resources managers, researchers, and local, state, and federal agency staff.

The Environmental and Water Resources Engineering Institute of the American Society of Civil Engineers

Minneapolis, MN

May 20-25, 2018.

The Water Resources Center is a unit of the College of Food, Agricultural and Natural Resource Sciences and University of Minnesota Extension.

Water Resources Center | 173 McNeal Hall | 1985 Buford Avenue | St. Paul, MN 55108
612-624-9282 | umwrc@umn.edu

CFANS
COLLEGE OF FOOD, AGRICULTURAL AND NATURAL RESOURCE SCIENCES
UNIVERSITY OF MINNESOTA
EXTENSION